

REMARKS

Claims 1-18 are pending in the current application. Claims 1 and 8 are independent claims. No new matter is added. In view of the below remarks, reconsideration and withdrawal of the rejections is kindly requested.

35 U.S.C. § 103 (A) REJECTION – BROOKS

Claims 1-7 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Brooks et al. (hereinafter “Brooks”), U.S. Patent No. 5,786,276. Applicants respectfully traverse this rejection.

Applicants submit that independent claim 1 recites a method for etching a silicon nitride film comprising heating the semiconductor substrate to a process temperature of at least about 40 °C wherein the etching gas has an etching selectivity of above about five between the silicon nitride film and the buffer layer at the process temperature. Example, non-limiting embodiments are discussed throughout the Specification. The Examiner’s attention is directed, for example, to paragraphs [0018] and [0036] of the present Specification.

As such, Applicants submit that Brooks is not pertinent to the etching selectivity of above about five at a process temperature of at least about 40°C feature of the instant application.

Brooks

Referring to FIG. 4, Brooks teaches that a “[g]ood nitride versus oxide selectivity is defined herein as at least about 50:1, and more preferably at least about 80:1, and even more preferably at least about 100:1. As seen in FIG. 4, except for region (e), exceptionally good nitride versus oxide selectivity is obtained in the experimental window. As seen in FIG. 2.

regions (a) through (d) qualify as providing high etch rates.”¹ Thus, Brooks teaches away from Region e, having an etching selectivity of 100:1 or less.

In view of the above, Applicants submit that Brooks fails to teach an etch selectivity of about five when the process temperature is about 40 °C.

Accordingly, Brooks fails to anticipate or suggest “heating the semiconductor substrate to a process temperature of at least about 40°C...wherein the etching gas has an etching selectivity of above about five between the silicon nitride film and the buffer layer at the process temperature” as recited in independent claim 1.

As such, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of independent claim 1.

Reconsideration and withdrawal of the rejection to claims 2-7, at least by virtue of their dependency on independent claim 1, is respectfully requested.

35 U.S.C. § 103(a) - ZHU

Claims 1-7 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Zhu et al. (hereinafter “Zhu”), U.S. Patent Publication No. 2002/0182880. In view of the following remarks, Applicants respectfully traverse this rejection.

Zhu, directed to a method of plasma etching silicon nitride, teaches “...it is possible to obtain nitride: oxide etch rate selectivities of over 40:1.” Zhu, Abstract. Zhu provides no other teaching or motivation to support etch selectivities of about 5:1. Thus, Zhu also fails to teach an etch selectivity of about five when the process temperature is about 40 °C.

¹ Brooks, col. 10, lines 14-21 (emphasis added).

As such, Applicants submit that Zhu fails to anticipate or suggest “heating the semiconductor substrate to a process temperature of at least about 40 °C...wherein the etching gas has an etching selectivity of above about five between the silicon nitride film and the buffer layer at the process temperature” as recited in independent claim 1.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of independent claim 1.

Reconsideration and withdrawal of the rejection to claims 2-7, at least by virtue of their dependency on independent claim 1, is kindly requested.

35 U.S.C. § 103(a) – BUYNOSKI, BROOKS AND ZHU

Claims 8-12 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Buynoski et al. (hereinafter “Buynoski”), U.S. Patent No. 6,300,203 in view of Brooks or Zhu. Applicants respectfully traverse this rejection.

Brooks or Zhu fail to render independent claim 8 obvious to one skilled in the art, for reasons similar to independent claim 1. Furthermore, Buynoski is silent with regard to etching selectivities. Thus, Buynoski fails to teach the deficiencies of Brooks and Zhu.

As such, Applicants submit that Buynoski in view of Brooks or Zhu fails to disclose or teach “heating the semiconductor substrate to a first processing temperature of at least about 40°C...wherein the first etching gas has an etching selectivity of above about five between the silicon nitride film and the first buffer layer at the first process temperature” as recited in independent claim 8.

Therefore, claims 9-12, at least by virtue of their dependency on independent claim 8, are also patentable over Buynoski in view of Brooks or Zhu.

Reconsideration and withdrawal of the rejection to claims 8-12 is respectfully requested.

35 U.S.C. § 103(a) – BUYNOSKI, BROOKS, ZHU AND TSENG

Claims 13-18 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Buynoski in view of Brooks or Zhu and further in view of Tseng, U.S. Patent 5,733,808. Applicants respectfully traverse this rejection.

Buynoski in view of Brooks and Zhu fails to render claim 8 obvious to one skilled in the art, as discussed above.

Tseng teaches “[t]he silicon nitride etch rate preferably has a selectivity to SiO₂ from about 10:1 to 20:1.”² Thus, Tseng fails to teach an etch selectivity of about 40°C. As such, Tseng fails to teach the deficiencies of Buynoski, Brooks and Zhu.

Accordingly, Applicants submit that Buynoski in view of Brooks or Zhu further in view of Tseng fails to teach or suggest “heating the semiconductor substrate to a first processing temperature of at least about 40°C...wherein the first etching gas has an etching selectivity of above about five between the silicon nitride film and the first buffer layer at the first process temperature” as recited in independent claim 8.

Claims 13-17, at least by virtue of their dependency on independent claim 8, are also patentable over Buynoski in view of Brooks or Zhu and further in view of Tseng.

Reconsideration and withdrawal of the rejection to claims 13-17 is respectfully requested.

For reasons similar to the above arguments regarding independent claim 8, Applicants submit that Buynoski in view of Brooks or Zhu and further in view of Tseng also fails to teach or suggest “heating the semiconductor substrate to a process temperature of at least about 40 °C...wherein the etching gas has an etching selectivity of above about five between

² Tseng, col. 5, lines 57-58.

the silicon nitride film and the buffer layer at the process temperature" as recited in independent claim 1.

Reconsideration and withdrawal of the rejection to claim 18, at least by virtue of its dependency on independent claim 1, is respectfully requested.

CONCLUSION

Accordingly, in view of the above remarks, reconsideration of the rejections and allowance of the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, Dickey, & PIERCE, P.L.C.

By

John A. Castellano, Reg. No. 35,094

P.O. Box 8910
Reston, Virginia 20195
(703) 668-8000

JAC/CDW